

A R E S P O N S E T O

Arkansas State Health Alliance for Records Exchange

For

Request for Information (RFI) for
Arkansas Health Information Exchange
(HIE)

May 7, 2010



Presented by:

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One Allied Drive
Little Rock, AR 72202

May 7, 2010

Alison Nicolas
Arkansas State Health Alliance for Records Exchange
Arkansas Coordinator for Health Information Technology
1401 West Capital, Suite 300
Little Rock, Arkansas 72201

Dear Ms. Nicolas:

Verizon welcomes this opportunity to submit its response to the Arkansas State Health Alliance for Records Exchange (SHARE) Request for Information (RFI) on Health Information Exchange. Verizon's Senior Management is dedicated to National Healthcare reform, and is equally committed to extending our strategic and many cases, life sustaining, communications services for the residents of the State of Arkansas.

Verizon sees Health Information Exchange as a logical extension of the valued voice/data communication services we provide today. Combining our leading Security and integration experience to the connectivity services we provide the national medical community uniquely positions Verizon as the provider for Healthcare interoperability at the Community, State, and National level.

Verizon is poised and pleased to offer our robust and secure Network Computing Platform for Healthcare to the Arkansas State Health Alliance for Records Exchange and its leaders to assist in the enablement of this critical and federally mandated service to the State and its residents.

Verizon has designed and developed an open and standards based Health Information Exchange solution that we offer as a Service (HIE as a Service/HIEaaS). Verizon's HIE (VHIE) is a highly secure and flexible solution that provides unparalleled collaborative Health Information Exchange. VHIE connects care delivery organizations, their patients, Doctors, labs, and any other eligible providers/payors requiring access.

Our Healthcare Vertical team continues to focus on existing and new technologies that will aid Healthcare workers in the improvement of patient care. Verizon will demonstrate how Patient Health Information is protected, accessed, and shared using security methods and standard that rivals the industry.

As I look forward to moving to the selection round of your process, I am encouraged that we not only have a team that is unmatched with industry skills and standards, but that Verizon can provide the foundation (Network) in which these new technologies will reside. As part of the Verizon Healthcare Vertical team, please feel free to contact Kathy Lower or Jim Cobon for any issues you may have.

Sincerely,

Katherine Lower
Account Manager

James Cobon
VS Industry Partner

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General Information

Nature of Proposal

This proposal is being submitted to the Exchange by Verizon Business Network Services, Inc., on behalf of applicable Verizon entities, and is contingent upon the parties' execution of a written agreement consistent with this proposal and such other terms and conditions as the parties may mutually agree upon.

In the event of an award to Verizon Business, Verizon looks forward to good faith negotiations with the Exchange resulting in Verizon and the Exchange entering into a written agreement that includes such mutually agreeable terms and conditions.

Confidentiality Statement

This RFP response may contain confidential and proprietary information of Verizon Business and is submitted to Arkansas State Health Alliance for Records Exchange in confidence:

(i) for use solely for the purpose of evaluating the products and services proposed herein; and

(ii) on the condition that, except as otherwise required by law, by receiving this RFP response, Arkansas State Health Alliance for Records Exchange and its representatives will be deemed to have agreed to the confidentiality of the selected information and, to treat the designated information contained in the RFP response, any confidential information relating to Verizon Business technology, business affairs, as strictly confidential, to not reproduce or copy it, and to not disclose the designated information contained herein to any others, except for the evaluation purposes stated above.

If this RFP response results in a contract, Arkansas State Health Alliance for Records Exchange may retain this response for its use in connection with the products and services covered by such contract.

Pricing Disclaimer

Unless otherwise indicated in this proposal, prices do not include, and Exchange will be required to pay, all applicable taxes and surcharges (including, but not limited to, sales, use, utility, gross receipts, and VAT), similar tax-like and tax-related charges, and other communications taxes, fees and surcharges levied as a result of receipt of the services from Verizon Business, except to the extent that current exemption certificates have been furnished to Verizon prior to issuance of any invoices, or except to the extent that the Exchange is exempt from such taxes under applicable law.

Verizon Business's proposed pricing is based upon Verizon Business's response to this RFP. It must be noted that the pricing submitted is budgetary only, pricing would be firmed up after discussions and Exchange input that would inform the drafting of a final agreed Statement of Work to be attached to the final negotiated contract.

Validity Period

Unless otherwise stated in this proposal, this proposal is valid for a period of forty-five (45) days from the date submitted.

During this period, promotions may expire and rates, charges, and/or discounts may fluctuate with changes in the Tariffs or Guide unless fixed in this proposal.

Additionally, prices may change based upon any changes in terms and conditions agreed to by the parties.

Section 1 Point-by-Point Response

This Is Not A Request For Proposal

Request for Information (RFI) for

Arkansas Health Information Exchange (HIE)

Response Due by: May 7, 2010, 3 p.m. CDT

Email Response to:

*Alison.nicholas@hit.arkansas.gov
Arkansas Coordinator for Health Information Technology
1401 West Capital, Suite 300
Little Rock, Arkansas 72201*

See Schedule of Events for Other Key Dates

Verizon Business Response

Read and understood.

1. Purpose

The Arkansas State Health Alliance for Records Exchange (SHARE) is seeking informational responses regarding creation and implementation of an interoperable health information exchange structure for the State of Arkansas.

The Arkansas Coordinator for Health Information Technology is seeking this information on authorization from the Arkansas Department of Finance and Administration, the state-designated entity for Arkansas's Health Information Exchange (HIE).

This Request for Information (RFI) is in support of the SHARE mission and vision of supporting the development of a mechanism through which individuals, health care providers, and health organizations can share health-related information.

The development of SHARE will advance secure connectivity and serve as a sustainable, interoperable data exchange platform for health-related information. Additional information about Arkansas HIE efforts may be found at the following link: <http://recovery.arkansas.gov/hie/>

Responses to this RFI will be received and reviewed completely. A detailed Request for Proposal (RFP) may be prepared and released based on the review of the responses and other information.

A demonstration of the proposed solution may also be requested of respondents in addition to the RFI response, and as part of the qualifying process. If a RFP is issued, it may be sent to selected and qualified respondents.

All RFI responses should be sent by email to Alison.nicholas@hit.arkansas.gov.

If questions should arise regarding the HIE RFI or how to submit it, please direct questions by email to Alison.nicholas@hit.arkansas.gov with "RFI Question" in the subject field. All questions and answers will be distributed to all respondents according to the schedule.

Verizon Business Response

Read and understood

2. Schedule of Events

Event	Date
Release RFI	April 8, 2010
Deadline for Notice of Intent to Respond	April 15, 2010, 3 p.m. CDT
Vendor Questions Due	April 20, 2010, 3 p.m. CDT
Release Clarifications based on Vendor Questions	April 27, 2010
Vendor RFI Responses Due	May 7, 2010, 3 p.m. CDT
Planning Date for Future Request(s) for Proposal	Not Before September 1, 2010

Verizon Business Response

Read and understood

3. Terms and Conditions

1. *This RFI and RFI process is solely for SHARE's benefit and is only intended to provide information to SHARE. The RFI is designed to provide respondents with the information necessary for the preparation of informative responses.*

The RFI is not intended to be comprehensive, and each respondent is responsible for determining all the factors necessary for submission of a response. The RFI response will not be subject to an RFP type evaluation, but only to a review of the information respondent provides.

Verizon Business Response

Read and understood

2. ***SHARE reserves the right not to review or otherwise to reject, in whole or in part and at any time, any or all responses received in response to this RFI. An RFI response may be rejected outright and not reviewed for any or no reason. Issuance of the RFI in no way constitutes a commitment by SHARE to award any contract or any request for proposal (RFP) for the goods and services described in the RFI.***

Verizon Business Response

Read and understood

3. ***SHARE is subject to strict accountability and reporting requirements as a recipient of funds from public sources.***

Any response or other information submitted by a respondent to SHARE is subject to disclosure by SHARE as required by law, including but not limited to, the American Recovery and Reinvestment Act of 2009 (Public Law 111-5). SHARE makes no agreements or representations of any kind, and expressly disclaims any requirement to maintain the confidentiality of any information provided by respondent in response to this RFI.

All material and information provided to SHARE in response to this RFI shall upon receipt become the property of SHARE and will not be returned.

Verizon Business Response

Read and understood

4. ***By submitting a response, the respondent agrees that SHARE may copy the response for purposes of facilitating SHARE's review or use of the information.***

SHARE will have the right to use ideas or adaptations of ideas that are presented in the response. The respondent represents that such copying will not violate any copyrights, licenses, or other agreements with respect to the materials submitted.

Verizon Business Response

Read and understood

5. ***SHARE reserves the right to modify this RFI at any time. SHARE reserves the right to contact respondents after the submission of responses for the purpose of clarifying any response.***

By submitting a response each respondent agrees that it will not bring any claim or have any cause of action against, SHARE or any agent of SHARE or the State of Arkansas, based on any misunderstanding concerning the information provided in the RFI or concerning SHARE's failure, negligent or otherwise, to provide the respondent with pertinent information as intended by this RFI.

Verizon Business Response

Read and understood

6. *SHARE is not responsible for any costs incurred by a respondent that are related to the preparation or delivery of the response or any other activities of respondent related to this RFI.*

Verizon Business Response

Read and understood

4. **Descriptive Information About the Arkansas HIE**

The technical infrastructure of the Arkansas HIE will support recognized data standards, code sets, and exchange standards for each component architectural layer. Those layers include technical, privacy and security, administrative context, clinical context, and the Nationwide Health Information Network (NHIN).

The HIE will be designed to permit participants (clinical and administrative) to incrementally migrate from a basic exchange to full integration as national, state, and user-based standards and associated technologies evolve. The role of the HIE will be to incorporate data from many sources and formats as standards and technologies evolve to facilitate exchange and to meet national standards.

The HIE will seek to capitalize on existing community, private, and public, health information exchange capabilities to build a statewide HIE. The HIE will participate with other participants in the NHIN to facilitate and promote care coordination with local Veterans Administration, Indian Health Services, public health, and Department of Defense (DOD) military health systems. (There are no Indian Health Services entities within the State of Arkansas.)

As previously mentioned, the HIE will coordinate with Medicare and Medicaid in support of information exchange and interoperability.

Verizon Business Response

Read and understood

4.1 **Interoperability**

The prioritized focus of the HIE for interoperability and meaningful use criteria will be:

1. *Clinicians (physicians, nurses, hospitals, clinics, laboratories, pharmacies)*
2. *Citizens (patients, consumers)*
3. *Public health entities, including registries*
4. *Payers (private and public)*

It is anticipated that adoption of HIE services will need to be phased in as providers are at varying levels of sophistication related to electronic capabilities.

The Strategic Plan and the associated Operations Plan are built upon a proof of concept and a phased approach that is intended to promote implementation of technology and end-user adoption.

This phased approach will capitalize to the extent possible on existing technologies and community HIEs within the State and on a scale and schedule that is fiscally sustainable.

The core functionality of the HIE is to provide services for the exchange of structured health care data between certified systems. The HIE will accumulate a Master Patient Index (MPI) and a Master Encounter Index/Record Locator Service. The HIE will standardize and facilitate messages used to request, view, and transmit information and will validate user security. The HIE will provide services to view information via a web-based portal.

While the HIE services will be proven and phased in over time as described in the Operations Plan, it is the goal of the HIE to support sharing these services within and across the HIE upon its completion of the proof of concept phase (2011). Examples of the types of information and structured health care data to be exchanged include:

- *Patient demographic information*
- *Patient vital information such as height, weight, body mass index (BMI), problem list/health issues, care providers*
- *Medication information to include prescriptions, refill requests, fill status, prescription history, and current medications*
- *Diagnostic testing information, such as clinical laboratory orders and results*
- *Other structured clinical summary information*
- *Public health information, such as immunizations*
- *Insurance type, identification numbers, payer name, and payer contact information*

The Strategic Plan and Operational Plan may have to be updated as the final rules governing Meaningful Use are published in 2010. It is the mission of the HIE to support physicians, institutional providers, and other health constituencies in meeting the requirements for Meaningful Use of health information.

The HIE will coordinate with the State Medicaid MMIS to provide the information-sharing infrastructure for exchange of electronic eligibility, claims, medication ordering and tracking, patient interaction, and quality reporting.

As the State Medicaid department advances its selection of the MMIS, the HIE will work directly to provide and support the electronic health information exchange component of that system for Medicaid providers and patients.

Verizon Business Response

Read and understood

4.2 **Technical Architecture and Approach**

The key overall principles for the HIE are as follows:

1. ***The HIE will provide an infrastructure that is secure and protects the privacy of consumers, providers, and other constituents. Participants can be confident that their health care data is secure, private, and appropriately accessed.***

Verizon Business Response

By adhering to industry best practices and standards as dictated by HIPAA and HITSP, the Verizon HIE uses NHIN standards and national guidelines for security, privacy, confidentiality, and integrity in the context of a state initiative.

Verizon is the leader in Data Security and maintains one of the most extensive portfolios of Governance, Regulatory, and Compliance solutions/services in the world. The Verizon HIE is supported by our industry leading Managed Security & Network services so that the extended enterprise is connected via secure SSL/VPN/PIP connections.

Verizon will deploy our globally leading Cybertrust Security solutions for certain requirements related to the Security continuum. Verizon will deploy our innovative identity and access management solutions (IAM) to provide authenticated access. Verizon will deploy extraordinary depth in defense measures.

2. ***The HIE will improve the health care delivery process in Arkansas by providing information availability when and where it is needed.***

Verizon Business Response

The Verizon HIE solution is a standards-based, secure data exchange that ensures timely information is available at the point of care enabling improved coordination of patient care among health care providers, while ensuring that a patient's health information is secure and confidential.

The solution supports better coordination of patient care by facilitating faster delivery of pharmacy, laboratory and other results to clinicians, better data integration for decision support and improved exchange of patient health information.

3. ***Best practices and standards for information technology infrastructure will be utilized to the extent possible and practical in the creation of the HIE.***

Verizon Business Response

The Verizon Solution is built to adhere to NHIN standards through the use of a Service-Oriented Architecture (SOA) which internally passes messages using NHIN 2010 protocols that incorporate multi-layer security providing identity management, content management, PHI protection and encryption, access management and audit control.

The Verizon Master Data Management (MDM) solution comprises a set of services and tools that allow for the creation and management of a single master view of essential healthcare data including patients, providers, facilities, organizations, and communities.

As a key differentiator, the Verizon MDM infrastructure is built entirely on Nationwide Health Information Network standards and protocols. The Verizon MDM EMPI service is fully integrated and a similar architecture is in production use by the DHHS Office of the National Coordinator's (ONC) NHIN CONNECT project.

By adhering to industry best practices and standards as dictated by HIPAA and HITSP, the Verizon Solution leverages the NHIN standards to use national guidelines for security, confidentiality, and integrity in the context of a state initiative. In addition, it is recommended that the Solution be hosted in the HITRUST CSF v.2009 government-level secure computing environment.

4. ***NHIN standards specifications will be implemented in establishment of the NHIN Gateway functionality.***

Verizon Business Response

Verizon's technical approach is based on a NHIN CONNECT-based solution. NHIN CONNECT will be deployed as part of the Verizon HIE gateway to facilitate inter-state, intra-state, and federal agency communication.

5. ***The HIE technical infrastructure will attempt to leverage existing sources of health information to the extent possible and capitalize on current health exchanges within Arkansas.***

Verizon Business Response

Verizon will work with the State and current health exchanges within Arkansas to leverage existing sources of health information and integrate data where possible.

6. ***The HIE architecture will support an incremental deployment of a statewide exchange capability.***

Verizon Business Response

The Verizon HIE is modular in design and supports incremental deployment and expansion that will be matched to Arkansas' requirements for rollout of a statewide exchange.

7. ***The HIE technical infrastructure will start with proof of concept and expand as rapidly as technologically and operationally feasible within the financial constraints of the project.***

Verizon Business Response

Verizon is able to support deployment through an initial proof of concept as well as rapid expansion of a total solution as project budget and resources are supported by the State.

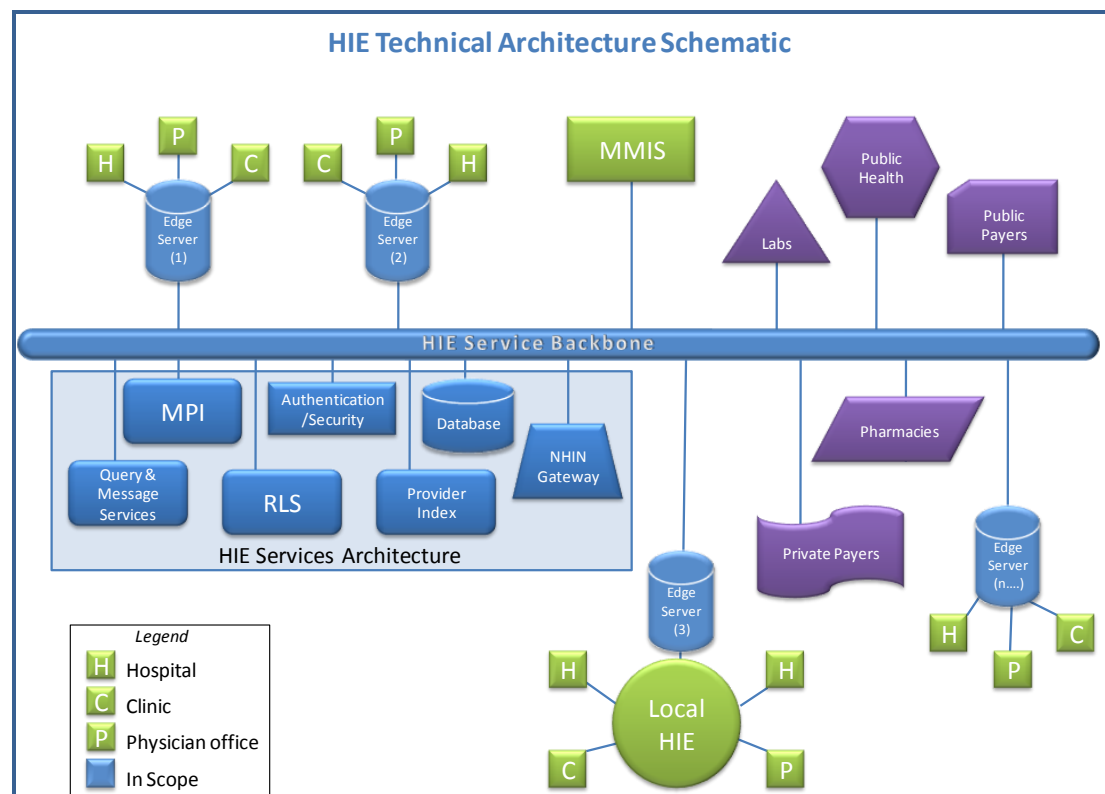
8. ***The HIE technical infrastructure will provide messaging infrastructure with guaranteed, secure information delivery.***

The Arkansas HIE will utilize a hybrid federated architecture of decentralized databases that are connected across the exchange to share and exchange information.

A Master Patient Index (MPI) and Record Locator Service will be used to provide patient/record matching services.

The central service “hub” provides MPI, provider index, and record locator services. Data storage is provided at decentralized edge server “vaults” (either physical or virtual).

A high-level architectural schematic is displayed below:



Please note that HIE Services components include the blue HIE Service Backbone and the components included in the blue HIE Services Architecture box. Local HIE clusters can have varying architectures, to meet local requirements. Each local HIE cluster is connected to the HIE Service Backbone as illustrated above.

Verizon Business Response

The Verizon HIE is a secure, flexible and customizable messaging platform that ensures the appropriate routing and secure delivery of certain health data between participants.

The Verizon HIE customized for the State of Arkansas will include an Enterprise Master Patient Index (EMPI), Record Locator Service (RLS), Security/Authentication, NHIN Gateway, provider indexing along with query and messaging services among other capabilities.

The Solution has the ability to receive real-time data feeds from data source systems and securely deliver the results to a targeted destination.

4.3 Design Principles and Requirements

The following are proposed design principles and requirements for the Arkansas Health Information Exchange:

1. *The HIE will be “vendor neutral,” i.e., vendor products must be non-proprietary and interoperable with others.*

Verizon Business Response

Our HIE solution is designed to use open standards enabling interoperability and the capability to operate with multiple vendor solutions. The solution provides a generic transformation service and common transport mechanisms to support the submission of electronic data. We support standards-based and proprietary transactions.

2. *The HIE will rely upon a network, or infrastructure, to provide service functionality.*

Verizon Business Response

Verizon will provide the end-to-end network and infrastructure to deliver the Arkansas HIE solution along with Information Technology (IT) support, information security and other component solutions.

We will securely connect the Arkansas state Regional Health Information Exchanges enabling increased productivity and efficiency. In addition, the Verizon network has auditing functions for non-repudiation, authentication and access controls, and a database security and disaster backup plan.

The Verizon Network Management Services provide 24x7x365 automated monitoring and support so that all end point data feeds are online and communicating to the exchange.

3. ***The HIE will be a “hybrid” architecture; not completely federated nor centralized. In the development of a phased implementation, it may be practical to start with a centralized architecture and evolve to a “hybrid” architecture.***

Verizon Business Response

The Verizon HIE solution can support a “hybrid” architecture of centralized and federated components.

4. ***The HIE will be focused on facilitating exchange of information, rather than the end user application functionality.***

Verizon Business Response

The Verizon HIE solution includes core capabilities of secure information exchange in locating and retrieving health care information within and among multiple organizations, disparate systems and other entities such as health information exchanges.

The solution interoperates with other vendor “applications” that provide the end user functionality required within the healthcare eco-system. We maintain a library of template interfaces to nearly all of national Electronic Medical Records (EMR) vendors.

5. ***The HIE will support construction and aggregation of the longitudinal patient record for secure sharing among authorized users across the network.***

Verizon Business Response

The Verizon HIE solution manages inbound data feeds with centralized configuration by Verizon for secure federated data transport, transformation, and aggregation services.

The Verizon Clinical Knowledge Repository decomposes all structured messages into a standards-based clinical data repository and data warehouse for rapid view of patient longitudinal health records along with near real-time analytics.

6. ***The HIE will comply with current interoperability standards available in the market today.***

Verizon Business Response

The Verizon HIE supports current applicable standards for interoperability whenever possible.

7. ***The HIE will interoperate with existing community and private health information exchanges as well as the NHIN infrastructure.***

Verizon Business Response

The Verizon HIE solution leverages the NHIN CONNECT architecture and standards whenever possible for connecting with existing community and private health information exchanges and with the NHIN infrastructure. The solution uses national guidelines for security, confidentiality, and integrity in the context of a state initiative.

8. ***The HIE technical architecture will be scalable and expandable.***

Verizon Business Response

The Verizon HIE solution is highly scalable and extensible with virtually limitless capacity for expansion.

9. ***The HIE will utilize standard security protocols supporting user authorization, authentication, non-repudiation, encryption, and administration. It also should support security auditing functions.***

Verizon Business Response

The Verizon HIE solution utilizes standard security protocols and security auditing functions. The solution also supports functions for non-repudiation, user authorization, authentication, encryption and access controls.

The Verizon Network Management Services provide 24x7x365 automated monitoring and support so that all end point data feeds are online and communicating to the exchange.

10. ***The HIE will utilize standard data storage and management protocols normally associated with large information technology solutions and available in the market today.***

Verizon Business Response

The Verizon HIE solution has strong database storage and management capabilities for securely receiving data, cleansing data, matching data to patients and providers and storing or routing data appropriately. The solution also includes extensive data backup and recovery features as well as data-cleaning, standardization, pre-processing, and error/exception handling processes.

The Verizon HIE solution for Arkansas will be a fully redundant and virtualized environment with real time replication and automated failover to another Verizon SmartCenter image. The Verizon HIE solution will replicate data at Verizon Internet Protocol (IP) backbone transport speeds of 40GB+ per second. Another feature of our solution is that all data is backed up per stringent Disaster Recovery (DR) / Business Continuity Plan (BCP) standards in a secure and encrypted format.

11. ***The HIE will be supported by industry standard business continuity and disaster recovery infrastructure and processes.***

Verizon Business Response

The Verizon HIE solution includes backup, disaster recovery and business continuity plans, infrastructure and best-in-class management processes. The solution includes our backup service that is a fully integrated component of our BCP and disaster back-up plan.

The solution is fully redundant and maintained on both United States coasts. A natural disaster on the East coast would allow all data to be accessed via the West coast HIE image and vice versa.

12. ***The HIE must be compliant with the accessibility requirements as defined in Arkansas Act 1227 of 1999.***

Verizon Business Response

Verizon will need to discuss the points in the design with the State of Arkansas that will need to feature accessibility for persons with visual impairments. There was not sufficient information in the RFI to fully design and price these accommodations.

4.4 Core Requirements

The HIE core components are as follows:

1. ***Master Patient Index (MPI): Used to link specific patients to specific data. Includes a Record Locator Service and mismatch reconciliation processes. This component must allow human intervention to manage possible duplication and may create a system assigned Universal Patient Identifier (UPI) used internally.***

Verizon Business Response

The Verizon HIE solution will provide a set of Enterprise Master Patient Index (EMPI) services and tools that identify and correlate unique patients within a given community and state.

The EMPI service meets the objective of providing processes for collecting, aggregating, matching, consolidating, and distributing such data throughout a statewide utility to ensure quality, consistency, and control in the ongoing maintenance and application of patient identity management.

One of the most important features of the Verizon EMPI service is its ability to match records and identify possible duplicate patient records. Through the use of a probabilistic matching algorithm, potential duplicate records are identified ensuring that the Data Steward is empowered to either merge the records in question or treat them as unique records.

2. ***Data Dictionary and Vocabulary Standardization: Needed to create a standards-based “data normalization” process for diseases, lab results, diagnosis, and decision support.***

Verizon Business Response

The Verizon Terminology Service provides normalization and standardization of nomenclatures. The Terminology Service is a semantic interoperability support service for the Verizon HIE solution. Capabilities include the normalization and versioning of vocabularies and nomenclatures.

The Terminology Service supports standard terminologies such as SNOMED-CT, LOINC, ICD-9, and ICD-10 as well as the ability to normalize non-standard terminologies such as proprietary Laboratory Compendiums.

The Verizon HIE solution will provide a consistent coding standard by normalizing clinical information to HL-7 RIM specifications in order to support high quality exchange and the persistence of clinical information.

3. ***Provider Index and Directory: Used to identify and locate providers (doctors and other providers) based on National Provider Identifier (NPI) validation.***

Verizon Business Response

Given that providers exist with multiple National Provider Identifiers (NPIs), Verizon's approach focuses on the state licensing authority as the source of truth.

The Verizon HIE solution receives updated electronic provider lists from multiple systems and automatically reconciles providers using the provider registry and exchanged messages without the overhead of a cumbersome manual process.

Attributes of the Provider Registry include capture and storage of the provider name, participant provider identifier, organization, state license number, and an unlimited number of configurable fields that are made available to optimize automated provider matching.

NPI identifiers can provide a primary or secondary source of reconciliation for the Provider Registry for scenarios where the state licensing authority is not available as a Data Provider.

4. ***Standards-based: Utilizes standard communication protocols, nomenclature, and clinical terminology including, but not limited to, HL7 Clinical Document Architecture, SNOMED CT, and ICD-10. Other standards, or evolving standards, are:***
- a. ***SOAP***
 - b. ***CCD – Continuity of Care Document***
 - c. ***XML, JSON, BSON***

d. *DICOM*

e. *LOINC*

Verizon Business Response

The clinical messaging component of the Verizon HIE solution, based on HL-7 v3, XML, web services and emerging clinical messaging standards allows will allow clinical messaging to occur directly with Electronic Health Records (EHR) systems.

The Terminology Services are terminology agnostic, the Transformation Services are message content agnostic, and the Messaging Services are transport agnostic. This combination of agnostic services provides rich support for current and future communication protocols, nomenclature, and clinical terminologies. This architecture allows for a seamless flow of information and ensures the ability to perform real-time clinical decision support.

The Messaging Services respond to requests for information which are then orchestrated to support incoming and outgoing transformations to and from HL-7 2.x, HL-7 3.x CDA release 2, CCD, C83, C32, XML, ASTM X12N transactions, including transactions 270/271, 834 and 275, NCPDP, DICOM and other structured formats.

In keeping with HITSP standards and guidance, Verizon's Integration Service supports all widely used clinical terminologies and enterprise data interchange formats

5. ***Security: User authentication, authorization, non-repudiation, encryption, and access control functionality, including audit logging.***

Verizon Business Response

By adhering to industry best practices and standards as dictated by HIPAA and HITSP, the Verizon HIE solution leverages the NHIN architecture and standards to use national guidelines for security, confidentiality, and integrity in the context of a state initiative.

The solution uses 2-way Transport Layer Security (TLS), multi-factor authentication. Verizon's identity management support allows for different levels of proofing and credentialing with different types of technology that can both prevent fraud or detect fraud. Authorization capabilities include organization specific role based authorization, provider role by patient authorization, self-declare, and break-the-glass override for authorization of release of sensitive patient information.

In compliance with NHIN 2010 standards, our solution uses Extensible Markup Language (XML) Signatures and Security Assertion Markup Language (SAML) Assertions to achieve high levels of non-repudiation. Access security is configurable by role and many other attributes. Data and messages are encrypted. The solution will provide an audit trail at the workstation, user, office, facility and institution levels, among other features.

6. ***Flexible: Ability to complete any current and future required HIE competencies.***

Verizon Business Response

The Verizon HIE solution is designed for flexibility and is architected to demonstrate how the NHIN vision could be engineered in a production environment. This includes adherence to NHIN 2010 specifications and direct ONC guidance to ensure ease of implementing emerging standards and specifications.

The underlying model for the Verizon HIE solution is the HL-7 RIM from which nearly all advancement in Health IT in the United States has been based, including Clinical Document Architecture (CDA), Continuity of Care Document (CCD) C83, and C32.

5. Vendor Response Instructions

SHARE is seeking information from as broad an array of interested vendors as possible. Therefore, vendors may respond in a manner that presents a complete solution, or may respond to address particular capabilities represented by their solution. Responses must be limited to not more than the equivalent of 100 standard pages of information. Additional information may be provided as addenda; however, SHARE reserves the right to not consider any supplemental information.

5.1 Mandatory Response Requirements

Respondents shall provide the following information:

1. ***Name and Category of Respondent, such as systems integrator, licensee, service provider, hardware vendor, etc.***

Verizon Business Response

Verizon Business
Telecommunications Provider.

2. ***Name of Vendor Representative responsible for any future business opportunity with the State of Arkansas. Include contact information. General vendor background and corporate information is not required, but may be included in the Addenda.***

Verizon Business Response

Katherine L. Lower
Account Manager

One Allied Drive
Little Rock, AR 72202
501-905-4308
kathy.lower@verizonbusiness.com

3. *Summary Description of Solution, limited to three pages.*

Verizon Business Response

The secure exchange of healthcare information to facilitate patient-centric information flow for the citizens of Arkansas requires a technical architecture based on emerging standards, best practices, and scalability at a national level.

Harnessing the use of patient-centric information to meet and exceed true meaningful-use criteria requires vision, innovation, and partnership.

The Verizon HIE solution provides a unified statewide health network in which the healthcare continuum can interact and collaborate in a seamless, secure, and vendor-neutral environment.

Verizon's HIE solution offers an extensible, open standards-based solution built upon a reliable and fully redundant technology infrastructure for the secure exchange of electronic clinical documents supporting the federated, centralized, and hybrid models of health information exchange.

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NHIN

Verizon's HIE solution includes a core set of NHIN-compliant web services in use by the US DHHS Office of the National Coordinator's (ONC) NHIN CONNECT.

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The technical architecture uses the following high-level NHIN 2010 security requirements in implementing messaging as well as application data management:

- Confidentiality: Information is disclosed only to authorized users who need it for healthcare treatment, payment, or operations.
- Authentication: Participants receiving requests for information are able to verify the identity of the requester.
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The Verizon EMPI and RLS services provide the core Enterprise Master Patient and Encounter Indexes to identify and correlate unique patients and documents within a given community and state.

As a subcomponent of the Verizon Master Data Management (MDM) Indexing Service, the EMPI/RLS service supports the following:

- Probabilistic matching to match patients in disparate systems using data elements available in each system.
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- Performing Predictive Analysis

- Conducting Epidemiological Informatics such as Real-time Syndromic and Environmental Surveillance
- Business Intelligence (BI) and Reporting
- Dashboard View of Key Performance Indicators and Measures

4. ***List of Current Installed Locations for the recommended solution.***

Verizon Business Response

The Verizon Solution is a best-of-breed technology stack, utilizing core services delivered by best-in-class partners. It is our belief that no single entity currently uses all of the Verizon service offerings in a single setting. However, market research suggests that the following entities may have installed, used or considered using a core platform similar to the core platform provided by the Verizon Solution:

- MedVirginia
- United Kingdom's National Health Service (NHS)
- Province of Quebec

5. ***Estimate of implementation timeline: Pilot project and broader installation.***

Verizon Business Response

The Verizon Health Information Exchange is a Managed Service and is therefore immediately available for integration with Arkansas's trusted data sources, including your Master Patient Index sources and your source data for clinical information upon execution of an agreement to proceed.

The timeline to deploy any project is based on the number and type of data sources Arkansas wants to incorporate into the Verizon Health Information Exchange. Verizon, with your cooperation and assistance, will undertake an assessment of your data sources to determine the time necessary to establish the data transformation maps that will be necessary to integrate your data.

While the data transformation projects are underway, we meet with your team to define the custom features of our service, including the specific weighting of your EMPI deployment, configuration of your consent model, the development of operations integration procedures to define specific roles and responsibilities in support of your HIE platform, among other changes to customize our offering to meet Arkansas solution.

Depending on the number and complexity of data sources will determine the length of time it will take to deploy your HIE. It could take as little as three months and as long as a year. Verizon will work closely with Arkansas to define a schedule that meets Arkansas's needs.

6. Description of the Financial Business Models supported.**Verizon Business Response**

Verizon's Health Information Exchange service pricing model differs significantly from our competitors. Since Verizon's services are based on a managed services approach, the capital infrastructure, including network, hardware, software, hosting and maintenance fees are incorporated into the following one-time and monthly recurring fees:

1. One-time implementation fee based on the number of citizens the State of Arkansas intends to deploy over the term of the agreement, and;
2. A monthly recurring fee for the actual number of unique citizens registered in the Master Patient Index.

For example, if the Arkansas HIE assumes that it will achieve approximately 1,704,776 (59%) citizens managed by the platform over the term of the agreement, a one-time charge of \$2,130,969 would be incurred. For each subsequent citizen added to the platform, a one-time charge of \$1.25 would be applied.

The monthly recurring fee is based on the actual number of unique citizens that are defined in the Master Patient Index, determined on the first of every month. This quantity will be multiplied by \$0.058 to determine the monthly fee. If 10,000 citizens are in the Master Patient Index in that month a charge of \$580.00 would apply.

In addition to our core service, Verizon includes five (5) data transformation projects into our pricing. This includes the system design and development of the interfaces necessary to tie five of your source locations to the Arkansas HIE.

The Verizon Health Information Exchange has been designed to enable you to quickly deploy services in the most cost effective manner. Due to the rapid deployment of the service, Arkansas may benefit by contributing fewer state funds to project versus the projected \$605,571 of matching funds.

7. Suggested Service Level Agreement terms.**Verizon Business Response****Account Management Description****Team Structure****Service Delivery Team**

The service delivery team consists of two major components. The client team engages directly with you and provides a bridge to the back-end operations teams. The client team consists of the Client Executive and a Client Engineer.

Client Executive

We provide you with a Client Executive to manage operations and service delivery. The Client Executive serves as your proponent within our Verizon Health Information Exchange (“Managed Services”) operations and professional services organizations. The Client Executive also acts as a process bridge to integrate your processes with our ITIL processes.

The Client Executive is your primary contact point for tasks and deliverables associated with all Managed Services. The Client Executive will facilitate the operational process execution with Verizon Business personnel. He/she will conduct weekly and monthly status meetings to review Verizon Business services and measure performance against the service level agreement for our Managed Service.

The Client Executive oversees third party vendors that are required to provide any aspect of our Managed Services. The Client Executive also handles any changes or additions to services and updates contractual documents.

Client Engineer

The Client Engineer is responsible for the technical aspects of all Managed Services provided by Verizon Business. He/she works closely with our Operations Engineers to resolve problems, perform changes, and other services.

The Client Engineer participates in monthly and weekly status meetings, to provide technical feedback and issue management. He/she will work with your technical team to identify opportunities for improvement and facilitate execution of these improvements.

The Client Engineer will review and approve updates to our documentation about your Health Information Exchange deployment.

24x7 Operations Engineers

We staff our Operation Centers with highly skilled engineers with the goal of resolving 90% of all incidents at the first point of contact. The engineers present within the Operation Centers on a 24x7 basis include:

- Shift Lead
- Senior System Administrators
- Senior Database Administrators
- Network Engineers
- System Monitoring Engineers

Client Partner

We will provide you with a Client Partner, who is responsible for the business relationship. The Client Partner is your escalation path for service delivery or account management issues.

Reporting

Establishing a regular rhythm to operations is the key to delivering continuously improving levels of service. Regular reporting keeps feedback loops open and functional.

Weekly Operations Meeting

Participants: Day-to-day customer stakeholder(s)

Our Participants: Client Executive

Deliverable: Weekly operations report

Topics:

- Incident/problem recap
- Review of changes
- Review of operational metrics
- Status of “hot” issues
- Status of internal projects (tuning, peak period readiness, etc.)
- Review of coming week’s schedule

Monthly Delivery Review

Participants: Relationship/Contract Owner, Day-to-day customer stakeholder

Our Participants: Client Partner, Client Executive

Deliverable: Monthly Operations and Account Report

Topics:

- Operations Summary
- Historical Trending – All Ticket Types
- Category Distribution – Problem and Change Management
- Operational Metrics
- Service Level Metrics
 - Critical SLA Summary
 - Critical SLA Detail – availability
 - Critical SLA Detail – problem and change management
- Areas for focus/improvement

- Partnering opportunities

Engagement Lifecycle Review

The Engagement Lifecycle is our internal program of ongoing improvement. Twice a year, we will meet to discuss the current stage in the Engagement Lifecycle and identify tactical improvements to make over the next six months.

This is a forum in which we propose ways to improve our quality of service, sometimes through changes to joint processes, sometimes through changes to systems.

Participants: Senior Management, Relationship/Contract Owner

Our Participants: Client Partner, Client Executive

Deliverable: Engagement Lifecycle assessment

Content:

- Current Engagement Lifecycle stage
- Desired stage
- Blockers to progress
- Action items

Benefits

Our disciplined approach to account management allows us to customize our engagement to fit your needs while maintaining a consistently high level of service delivery. Our emphasis on transparency and feedback creates the necessary conditions for ongoing improvement in site stability, flexibility, and predictable costs.

Responsibilities

You must participate in the weekly, monthly, and semi-annual meetings.

Comprehensive Monitoring Description

Technology is deeply leveraged to provide the ongoing management services. This includes the best in class systems management tools integrated in to a robust operations management platform. This seamless system provides a secure, stable production operations environment from which we deliver this service.

Our management platform provides the deep, correlated monitoring for detection of problems and critical conditions that may affect system availability. Our monitoring practice incorporates best practices for tuning alerts and thresholds to increase alert accuracy and improve conditions for early problem detection.

This means the proactive response to trouble conditions and predictive response to problems before they occur.

Systems are instrumented in the following means:

URL Monitoring and Transaction

URL Monitoring provides a continuous check to verify client sites are responding. Specified URLs are monitored from the ROC and the Internet. Transaction monitoring verifies that specified Critical Business Processes are regularly verified via test transactions.

Core Process Monitoring

Process monitoring is a continuous check to ensure that core systems processes are running and behaving with predefined constraints. The following conditions are monitored:

- **Process Count** to alert when a process is not running or is running an inappropriate number of instances
- **% CPU** to alert when a monitored system process exceeds threshold for CPU utilization
- **% Memory** to alert when a monitored system process exceeds threshold for CPU utilization

Critical Business Process Monitoring

In addition to core process monitoring, Critical Business Processes (CBP) are monitored to assure transactional success of the application infrastructure. Clients provide direction on which transaction are mission critical and these become the cornerstones of the ongoing management, as well as the SLA for the overall service.

We monitor Health Information Exchange performance from the Internet using HP-OV Internet Services, Keynote, and Freshwater SiteScope. We execute synthetic transactions against the site, simulating user transactions.

If the availability or performance of the transactions goes below defined thresholds, we raise alerts about the affected CBPs.

System Resource Monitoring

Constrained resource conditions which persist over time, indicate a system problem or performance problem. The following resources are monitored against thresholds sustained over time, seconds and minutes, to allow for normal spikes in activity.

- **CPU Bottleneck** alerts when depth of global CPU run queue and CPU utilization percentage thresholds are met
- **CPU Idle** alerts by system idle percentage is zero for a sustained period

- **High Run Queue** determined by depth of global CPU run queue for activities waiting for CPU time
- **Blocked I/O** determined by requests blocked at global IO queue
- **Paging Activity** determined by global Memory Page Out and Page In rates for memory paged or swapped to disk
- **Page Scan Rate** determined by rate of access for paged memory
- **Process Table Utilization** alerts when percentage of allocated process table exceeds thresholds
- **Semaphore Utilization** alerts when percentage allocated kernel semaphores exceed thresholds
- **Shared Memory Utilization** alerts when percentage of shared memory in use exceeds thresholds
- **Disk Utilization** alerts when physical disk IO exceed thresholds
- **Disk Space** alerts when filesystem percentage space used exceeds thresholds

Log File Monitoring

Log files provide rich insight to application and transaction conditions. Thus, log files are monitored in real-time for error conditions. Alerts are raised when a log entry matches string patterns defined in the monitoring template. Monitored log files include system logs and specified application logs.

Data Collection

In addition to monitoring for alert conditions, many of our monitors sample performance and capacity data. This data is sent via HP-OV messages. Data samples are diverted from the main message stream to be captured in the data warehouse.

We use this data for numerous purposes, including periodic capacity reports, performance analysis, and file system trending.

While the alerts are used to react to situations, the data collectors give us the information we need to proactively prevent problems. For example, we do predictive trending on file system consumption to avoid file system full problems.

Event Correlation

The proprietary MARS system gets to look at all events in the message stream. It is able to correlate events across the network, applications, servers, and database, even when the events are separated in time. Event correlation aids in root cause analysis and rapid response, shortening the mean time to resolution.

For example, a single network device failure can cause alerts to appear from dozens or hundreds of servers. MARS gets past the multitude of server alerts to the alert

about the network device. It can suppress alerts that we know to be an effect rather than a cause, and it can also generate new, more specific alert messages.

Customized Monitoring

We work with all our clients to further localize our monitoring and management environment to ensure consistent and comprehensive operation of your systems. We have developed numerous custom monitoring agents and scripts to monitor client-specific application code, processes and log files.

Internally, we apply the knowledge gained from monitoring a client's operations to shorten the development process for additional tools. By incrementally adding to our monitoring toolset, each new client gets the benefit of that leverage.

We often construct monitors that execute synthetic transactions against any third-party software—such as middleware systems or third-party external systems—to verify that the client's CBPs will be successful.

External Integrations

Through our suite of monitoring tools, Verizon Business can monitor the availability of external integration points in several ways. These include execution of synthetic transactions against the remote endpoint, ping and port monitoring, tunnel status monitoring, and local log file scraping.

Combined with our standard approach of monitoring Critical Business Processes that execute across a number of architectural tiers, we can pinpoint breakdowns in service and rapidly identify when a third party service is having trouble.

Periodic Review

Thirty days after launch, the client team will review all thresholds and monitors. They will adjust these appropriately.

Benefits

Our approach to system monitoring provides unparalleled visibility into the past, present, and future of your systems. The combination of component-level and CBP-level monitoring allows us to triage incidents according to their importance to your business.

Historical analysis of performance data combines with predictive trending to enable capacity planning based on hard data.

Monitoring data drives ongoing improvements in operations, by highlighting recurring or high-impact problems.

Responsibilities

During TTO, we will ask you to define the Critical Business Processes and the steps needed to execute each of them. It may be necessary, or just helpful, to create

dummy users, products, or accounts to isolate synthetic transactions from monitoring from real transactions.

We will review alerts with you as part of Account Management, to look for opportunities to improve the accuracy of alerts.

We will often change monitoring configuration to improve visibility, detect warning signs of problems, or tighten thresholds. We will not relax thresholds without prior approval from you.

Change Management Description

The change management service provides a set of advanced tools and processes that reduce the risks inherent in modifying systems. Through change management, we document all system changes. A role-based access model and workflow ensure appropriate client review, approval, and control.

This change management process is designed to integrate and dovetail with your processes. Your assigned Client Executives and Client Engineers are responsible for mediating this integrated process. They participate in your change review meetings, assist in designing changes, and ensure that changes are fully specified and do not present risks to availability.

All change requests must include:

- Date and time of change
- Critical Business Processes affected by the change
- The business value of the change
- Expected duration to execute
- Detailed execution instructions
- Verification instructions
- Rollback instructions
- Contact information for the requestor, in case additional information is required during review or execution.

All changes, whether submitted by you or us, must pass two levels of review. First, you must approve all change requests, regardless of their origin. Once you have approved the change, it is then queued for approval by Verizon Business CAB. The Change Advisory Board (CAB) reviews and approves all changes before they are made.

The CAB will review each change to ensure it is comprehensive, does not conflict with other changes and complies with security and networking standards. As a change request progresses along each stage, a notification email is sent to the primary and secondary contacts noted on the change request. In addition, all change approvers are notified when a change is pending approval.

Once approved by the CAB, the change is scheduled for implementation.

Upon completion, change requests results are designated as “successful” or “failed”. One or more of the following conditions constitute a failure:

- The change was not executed because the approved window was missed.
- The change was not executed because the required hardware or software resources were not available.
- The success criteria were not met.
- The change was discovered to be implemented incorrectly.

Our change management process can accommodate emergency changes. The following table distinguishes between standard changes and emergency changes.

Table 1 - Change Management Service Levels

	Standard RFC	Emergency RFC
Change management service availability	24x7x365	24x7x365
Minimum lead time before execution	24 hours	30 minutes
Execution time limit	< 8 hours	< 2 hours
Lead time required to cancel or reschedule	4 hours	N/A
Implementation start time	Based on request	Within 30 minutes of requested start time
Scope restrictions	3 modifications per request	3 modifications per request

Benefits

Our ITIL-based, disciplined approach to change management is essential to keeping systems under control. The consistency of our approach gives you high confidence in your ability to adapt your systems to changing business requirements.

Responsibilities

We will:

- Provide access to active and completed change history.
- Execute approved changes on the client system, documenting steps taken to implement the requested change.

- Track all changes to the client system performed by Verizon Business, including requester and approval steps.
- Notify client of change start and change completion dates and times.
- Obtain approval for all changes from the specified client contacts
- Ensure appropriate backups are taken or mirrored volumes are updated prior to the change.

You are required to:

- Provide specific instructions, checklists and requirements to be used in performing changes and criteria for validation of successful implementation.
- Respond in a timely fashion to requests for approving change requests and approve changes.
- Restrict the use of emergency change requests to actual business emergencies.
- Submit “notification for change” tickets for external changes you or a third party will execute, that may affect the Managed Services.
- Provide recovery/back-out procedures to use in the event of Change failure.
- View and submit change requests.

Problem Management Description

When trouble conditions occur, Verizon Business’s Problem Management responds. All phases of problem management are covered under this service feature:

- **Identification** – Problems are identified proactively and severity level is assigned;
- **Evaluation** – Trouble condition is determined;
- **Remediation** – Solution and execution plan established;
- **Root-cause Analysis** – Root-cause is determined and auctioned accordingly.

Unlike many IT production environments, our Operation Centers are staffed with senior engineers 7x24x365. This staff includes expertise in network, application, database, and security. This approach, along with our monitoring platform means fast remediation to trouble conditions.

We also manage performance-related incidents under this service feature. This can include conditions such as application responsiveness, session timeouts, or slow database queries. This facet drives a quality user experience.

We assign severity levels to problem tickets based on the following criteria:

Table 2 - Incident Severity Definitions

Urgency Code	Urgency Level	Description
PR01	Critical	One or more <i>customer-defined critical business processes</i> are unavailable.
PR02	High	One or more <i>customer-defined critical business processes</i> are experiencing degraded performance, or there is an outage of no less than half of redundant components in the architecture.
PR03	Medium	Customer-defined critical business processes are available, but are experiencing a minor problem that does not impact core functionality. OR One or more system components are not functioning as intended, even though the customer-defined critical business processes are functioning normally.
PR04	Low	There is little (or no) functional impact to the system but site components may not be performing as designed.

Benefits

The problem management process results in increasing availability over time, due to the focus on root cause analysis and correction. We review incident responses, looking for opportunities to improve the efficiency and accuracy of operations. This can include application software changes, patches, new or revised monitoring, and new response procedures.

Responsibilities

We will:

- Provide access to active and resolved ticket information.
- Manage problem resolution process for managed components, which consists of identification, verification, diagnosis, attempted resolution, tracking, escalation and documenting problems with your HIE deployment on a 7x24x365 basis.
- Provide problem management from problem ticket inception through resolution including assigning severity levels and designating responsibility for resolving problems.
- Provide management of your third-party service providers that are responsible for resolving problems.
- Provide notification upon creation and resolution for all problem tickets via e-mail, and via phone for Severity 1 problems to specified client contacts.

You are required to:

- Assist us with the identification and resolution of problems with your HIE deployment, as reasonable and required.

Designate Verizon Business's Operations as an authorized contact on any third party maintenance or support agreement(s).

8. ***Estimated Cost of Solution Components, including license fees, third-party license fees, hardware (server and storage), and recurring maintenance fees.***

Verizon Business Response

Verizon's HIE service pricing model differs significantly from our competitors. Since Verizon's services are based on a managed services approach, the capital infrastructure, including network, hardware, software, hosting and maintenance fees are incorporated into the following one-time and monthly recurring fees:

- One-time implementation fee based on the number of citizens the State of Arkansas intends to deploy over the term of the agreement, and;
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For example, if the Arkansas HIE assumes that it will achieve approximately 1,704,776 (59%) citizens managed by the platform over the term of the agreement, a one-time charge of \$2,130,969 would be incurred. For each subsequent citizen added to the platform, a one-time charge of \$1.25 would be applied.

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5.2 General Solution Description

This section should build on the Summary Description of Solution. It should describe how the solution addresses each of the following elements described in Section 4, Descriptive Information about the Arkansas HIE:

1. ***Interoperability***
2. ***Technical Architecture and Approach***

3. *Design Principles and Requirements*

4. *Architectural Overview*

5. *Core Requirements*

5.3 *Other Features*

In addition to the above, are there any other features, services, or options that SHARE should consider?

Verizon Business Response

The secure exchange of healthcare information to facilitate patient-centric information flow for the citizens of Arkansas requires a technical architecture based on emerging standards, best practices, and scalability at a national level.

Harnessing the use of patient-centric information to meet and exceed true meaningful-use criteria requires vision, innovation, and partnership.

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- Interoperability

The Verizon HIE solution addresses the prioritized focus of the Arkansas Health Information Exchange for interoperability and meaningful use criteria.

- Clinicians (physicians, nurses, hospitals, clinics, laboratories, pharmacies):
 - Use of Computerized Provider Order Entry (CPOE)
 - Implement drug-drug, drug-allergy, and drug-formulary checks
 - Maintain up-to-date problem list of current and active diagnosis based on ICD-9 CM or SNOMED-CT
 - Generate and transmit permissible prescriptions electronically (e-RX)
 - Maintain active medication list
 - Maintain active medication allergy list
 - Record demographics: preferred language, insurance type, gender, race, ethnicity, date of birth
 - Record and chart changes in vital signs: height, weight, blood pressure; calculate and display Body Mass Index (BMI); and plot and display growth charts for children 2-20 years including BMI
 - Record smoking status for patients 13 years old and older
 - Send reminders to patients per patient preference for follow-up/preventive care

- Incorporate clinical lab-test results into EHR structured data
 - Generate lists of patients by specific conditions to use for quality improvement, reduction of disparities, and outreach
 - Report ambulatory quality measures to Centers for Medicare and Medicaid Systems (CMS) or the States
 - Implement 5 clinical decision support rules relevant to specialty or high clinical priority, including diagnostic test ordering, along with the ability to track compliance with those rules
 - Check insurance eligibility electronically from public and private payers
 - Submit claims electronically to public and private payers
 - Provide patients with an electronic copy of their health information (including diagnostic test results, problem list, medication lists, and allergies), upon request
 - Provide patients with timely electronic access to their health information (including lab results, problem list, medication lists, and allergies) within 96 hours of the information being available to the EP
 - Ensure privacy and security protections for confidential information through operating policies, procedures, and technologies and compliance with applicable law
 - Provide clinical summaries for patients for each office visit
 - Capability to exchange key clinical information (for example, problem list, medication list, allergies, diagnostic test results), among providers of care and patient authorized entities electronically
 - Perform medication reconciliation at relevant encounters and each transition of care
 - Provide summary care record for each transition of care and referral
- Citizens (patients, consumers)
- Provide patients with an electronic copy of their health information (including diagnostic test results, problem list, medication lists, and allergies), upon request
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 - Provide clinical summaries for patients for each office visit
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- Perform medication reconciliation at relevant encounters and each transition of care
- Provide summary care record for each transition of care and referral
- Ensure privacy and security protections for confidential information through operating policies, procedures, and technologies and compliance with applicable law
- Public Health entities, including registries
 - Capability to submit electronic data to immunization registries and actual submission where required and accepted
 - Capability to provide electronic syndromic surveillance data to public health agencies and actual transmission according to applicable law and practice
 - Ensure privacy and security protections for confidential information through operating policies, procedures, and technologies and compliance with applicable law
 - Report ambulatory quality measures to CMS or the states
- Payers (private and public)
 - Ensure privacy and security protections for confidential information through operating policies, procedures, and technologies and compliance with applicable law
 - Report ambulatory quality measures to CMS or the states

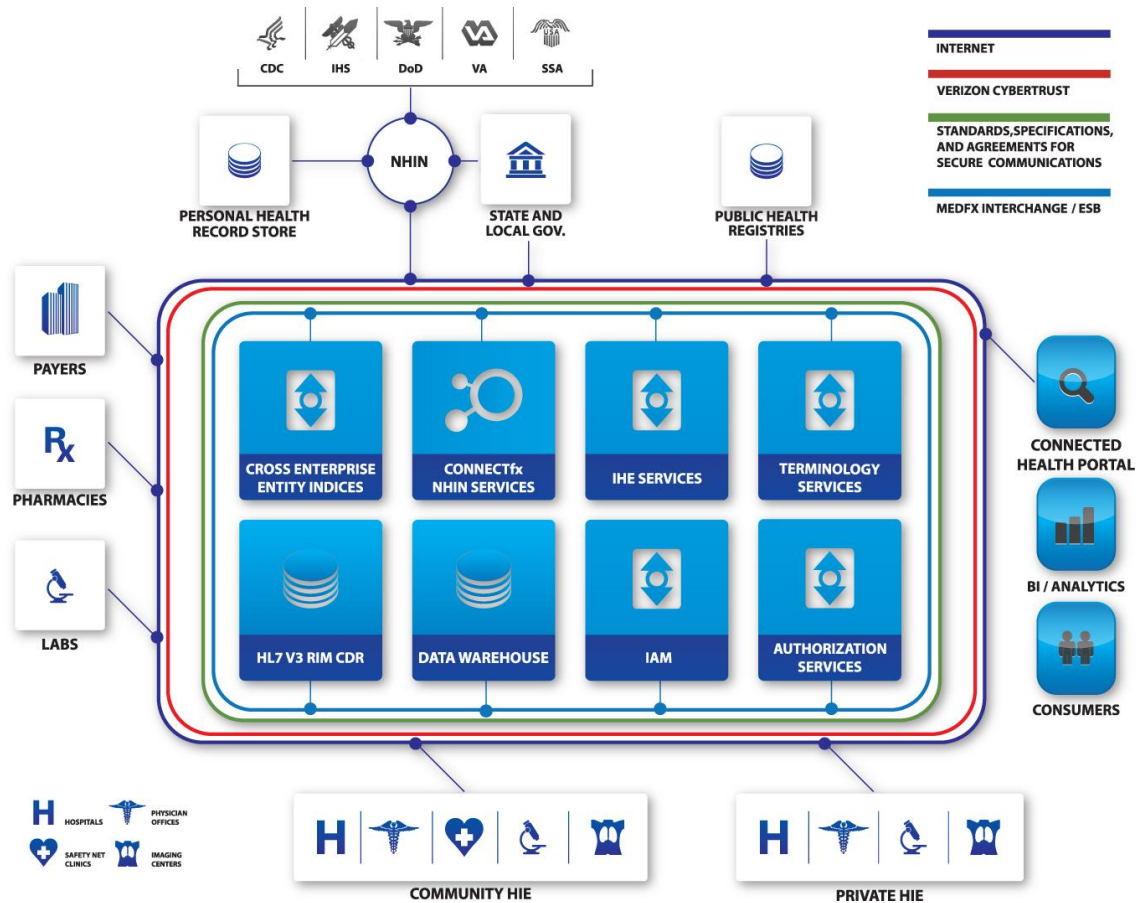
Verizon's HIE technical infrastructure fully supports the launch of a proof-of-concept approach to build an initial framework for the statewide exchange whereby certain Participants and patient populations participate in a pilot project milestone.

The high-availability virtualized environment is designed to align with budgetary considerations by dynamically provisioning services and computing power to achieve each milestone in the deployment of a full statewide health information exchange.

The Verizon HIE solution supports interoperability with State Medicaid Management Information Systems MMIS and other state and national entities to provide the information-sharing infrastructure, including electronic eligibility and claims transmission and for the exchange of medication ordering and tracking, patient interaction, and quality reporting.

Technical Architecture and Approach

The Verizon Technical Architecture diagram below illustrates the core services and technical approach being provided as a high-availability solution for a statewide hybrid health information exchange.



The Verizon HIE solution will provide an infrastructure that is secure and protects the privacy of consumers, providers, and other constituents. Participants can be confident that their health care data is secure, private, and appropriately accessed.

- The Verizon HIE solution provides a Trust Fabric to provide confidence to Participants of the Arkansas Health Information Exchange.
- Security, Patient Privacy, and Consent Management establish the technical and governance trust fabric elements for secure exchange of information as well as the standard specifications required for reliable interoperability.

The technical architecture uses the following high-level NHIN 2010 security requirements in implementing messaging as well as in implementing application data management:

- Confidentiality: Information is disclosed only to authorized users who need it for healthcare treatment, payment, or operations.
- Authentication: Participants receiving requests for information are able to verify the identity of the requester.
- Integrity: Participants are protected against unauthorized alteration of data. Authorized alterations of data are logged.

- Non-repudiation: The architecture disallows unilaterally revocation or alteration so that a sender cannot falsely deny sending a message and a receiver cannot falsely deny receipt of a message.

Verizon's HIE solution includes a core set of NHIN web services powered by the US DHHS Office of the National Coordinator's (ONC) NHIN CONNECT.

The Verizon HIE solution adheres to NHIN standards and specifications utilizing a Service-Oriented Architecture (SOA) that internally passes messages using NHIN 2010 protocols that incorporate multi-layer security providing identity management, content management, PHI protection and encryption, access management and audit control.

The Verizon HIE solution will improve the health care delivery process in Arkansas by providing information availability when and where it is needed.

The Verizon HIE solution improves the health care delivery process by combining its core strengths. Verizon is one of the largest telecommunications companies in the world with a global presence in the secure hosting of government and Fortune 500 data at SmartCenter facilities across the United States.

Using Verizon's dynamic fail-over and geographically distributed SmartCenter locations, health exchange information is available 24x7x365, offering high availability to the Participants of the solution.

The healthcare delivery process is further enhanced by the Verizon Secure Messaging Services, which provide for direct provider-to-provider communication supporting referral management and consultation results delivery with relevant clinical summary documentation.

Consider the following advantages:

- Best practices and standards for information technology infrastructure will be utilized to the extent possible and practical in the creation of the HIE.

The Verizon HIE solution was engineered under the guidance of HITSP, ONC, and industry leaders from the top NHIOs in the US. The technology infrastructure is based on NHIN 2010 and IHE specifications.

As an industry leader, Verizon participates in laboratory-based pilot projects such as the NHIN where emerging standards evolve.

- NHIN standards specifications will be implemented in establishment of the NHIN Gateway functionality.

The Verizon HIE solution was built from its foundation upon NHIN standards and specifications. Verizon intends to partner with organizations that have extensive experience with the NHIN, and who were the first private NHIN CONNECT in production connecting the first NHIO to the Social Security Administration for the processing of Disability Determinations.

Verizon and its perspective partners also participate in the pilot NHIN projects for connectivity to CMS and Veterans Affairs and Defense Departments (VA/DoD).

- The HIE technical infrastructure will attempt to leverage existing sources of health information to the extent possible and capitalize on current health exchanges within Arkansas.

The Verizon HIE solution is designed to leverage existing sources of health information including public and private payers, public and private Health Information Organizations (HIOs), and state registries.

- The HIE architecture will support an incremental deployment of a statewide exchange capability.

The comprehensive Verizon HIE solution is designed to encourage incremental deployment of a statewide exchange capability. Given Verizon's support for federated, centralized, and hybrid health information exchange models, there is flexibility to deploy services in phases to meet and to adjust requirements based upon analysis by the statewide exchange.

- The HIE technical infrastructure will start with proof of concept and expand as rapidly as technologically and operationally feasible within the financial constraints of the project.

Verizon's HIE technical infrastructure fully supports the launch of a proof-of-concept approach to build an initial framework for the statewide exchange whereby certain Participants and patient populations participate in a pilot project milestone.

The high-availability virtualized environment is designed to align with budgetary considerations by dynamically provisioning services and computing power to achieve each milestone in the deployment of a full statewide health information exchange.

- The HIE technical infrastructure will provide messaging infrastructure with guaranteed, secure information delivery.

As described above, the Verizon HIE solution creates a Trust Fabric for the statewide exchange-based NHIN 2010 specifications supporting the highest degree of guaranteed, secure information delivery.

Design Principles and Requirements

The design principles for the Verizon HIE solution are based on HITSP guidance, NHIN 2010 specifications, and IHE Profile support with a service offering utilizing technologies empowering the largest health IT initiatives in the world.

Verizon has leveraged its Network Computing Platform to bring connectivity, high availability, and scalability to the US health information exchange marketplace.

Verizon owns and operates the largest IP network in the world and provides industry-leading services that are imperative to the success of nationwide healthcare interoperability.

Verizon offers HIE as a service, which is unique in the industry. Verizon provides this mission-critical solution without the risk or expense of hardware and software licensing purchases.

- The HIE will be “vendor neutral,” i.e., vendor products must be non-proprietary and interoperable with others.

The backbone of the Verizon HIE solution is an Enterprise Service Bus (ESB) built upon an Integrated Service-Oriented Architecture (SOA) which provides complete neutrality as it relates to operating systems, vendors, and languages. Service transports and APIs such as HTTP and SOAP support the use of any programming language or framework technology that can adhere to the given specifications such as Java Enterprise or .NET.

- The HIE will rely upon a network, or infrastructure, to provide service functionality.

The Verizon HIE solution provides a secure standards-based health care information network to safely transact the delivery of protected health information between Participants on the Internet.

A Web Services Registry (UDDI) provides end-to-end SOA Governance to ensure a common communication channel for the automated exchange of metadata and service information among service consumers, providers, policy decision points, and additional governance tooling.

- The HIE will be a “hybrid” architecture; not completely federated nor centralized. In the development of a phased implementation, it may be practical to start with a centralized architecture and evolve to a “hybrid” architecture.

The Verizon HIE solution supports all nationally recognized models for health information exchange, including the hybrid model. It is entirely possible to embark upon implementation of a centralized model and to evolve to a hybrid model after some period of time.

- The HIE will be focused on facilitating exchange of information, rather than the end user application functionality.

The Verizon HIE solution can be provisioned as a pure statewide utility with no end user application functionality. A suite of web-based applications to leverage the use of the statewide exchange are offered but not imposed upon the Arkansas HIE.

- The HIE will support construction and aggregation of the longitudinal patient record for secure sharing among authorized users across the network.

Scalability and High Performance. A key differentiator of the Verizon HIE solution is the support of a completely aggregated longitudinal patient record that is capable of supporting the entire population of Arkansas.

Evolving from a centralized model to a hybrid model by partitioning health information into regions becomes an operational and governance decision and not a decision based on technological limitations.

- The HIE will comply with current interoperability standards available in the market today.

The Verizon HIE solution complies with the most current interoperability standards available in the market today as described above. The Verizon Health Information Exchange team continues to participate in pilot NHIN connectivity projects testing emerging NHIN standards with federal agencies and NHIOs.

- The HIE will interoperate with existing community and private health information exchanges as well as the NHIN infrastructure.

The Verizon HIE solution supports a comprehensive set of interoperability scenarios that include intrastate connectivity with public and private HIOs and interstate connectivity using the NHIN infrastructure.

- The HIE technical architecture will be scalable and expandable.

Scalability and expandability are delivered utilizing Verizon's national health information infrastructure and health network.

- The HIE will utilize standard security protocols supporting user authorization, authentication, non-repudiation, encryption, and administration. It also should support security-auditing functions.

As described above, the Verizon HIE solution creates a Trust Fabric for the statewide exchange based NHIN 2010 specifications supporting the highest degree of guaranteed, secure information delivery.

Security, Patient Privacy, and Consent Management

Security, Patient Privacy, and Consent Management establish the technical and governance trust fabric elements for secure exchange of information as well as the standard specifications required for reliable interoperability.

The technical architecture uses the following high level NHIN 2010 security requirements in implementing messaging as well as application data management:

- Confidentiality: Information is disclosed only to authorized users who need it for healthcare treatment, payment, or operations.
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- Integrity: Participants are protected against unauthorized alteration of data. Authorized alterations of data are logged.
- Non-repudiation: The architecture disallows unilaterally revocation or alteration so that a sender cannot falsely deny sending a message and a receiver cannot falsely deny receipt of a message.
- Audit Trail and Node Authentication (ATNA) Integration Profile is managed by the Verizon IHE Services (See Fig 1.) which establishes security measures which, together with the Security Policy and Procedures, provide patient information confidentiality, data integrity and user accountability.

- The HIE will utilize standard data storage and management protocols normally associated with large information technology solutions and available in the market today.

The Verizon HIE solution uses world-class data storage and management protocols

- The HIE will be supported by industry standard business continuity and disaster recovery infrastructure and processes.
- The HIE must be compliant with the accessibility requirements as defined in Arkansas Act 1227 of 1999.

The Verizon Solution is built upon NHIN standards through the use of a Service-Oriented Architecture (SOA) which internally passes messages using NHIN 2010 protocols that incorporate multi-layer security providing identity management, content management, PHI protection and encryption, access management and audit control.

- IHE / HITSP-compliant Core. At the core of the HIE is the infrastructure to support IHE profiles, HITSP standards and NHIN interoperability. The main components of this architecture are the Master Patient Index, the Master Provider Index, the Document Registry and multiple Document Repositories.
- Vendor and programming language-neutral Enterprise Service Bus supports a decoupling of implementation configuration and message flow from the core web service components.
- Knowledge Repository includes a Clinical Data Repository (CDR) and data warehouse to support the persistence of health information used for near real-time access of longitudinal health records and key clinical measures identified and tracked by Participants and Arkansas HIE.
- NHIN-based Edge Appliance available in physical or virtual form extends a partitioned Knowledge Repository to the 'edge' of Participants' source systems.
- Master Patient Index (MPI): This service is used to link specific patients to specific data and includes a Record Locator Service (RLS) and mismatch reconciliation processes. This component must allow human intervention to manage possible duplication and may create a system-assigned Universal Patient Identifier (UPI) used internally.

The Verizon EMPI and RLS services provide the core Enterprise Master Patient and Encounter Indexes to identify and correlate unique patients and documents within a given community and state.

As a subcomponent of the Verizon Master Data Management (MDM) Indexing Service, the EMPI/RLS service supports the following:

- Probabilistic matching to match patients in disparate systems using data elements available in each system.
- Patient Identifier Cross-Referencing and Patient Demographics Query (IHE PIX/PDQ).

- Cross Enterprise Document Sharing (XDS.b) to collect clinical data and run advanced analytics for future applications of public health reporting and clinical decision support.
- Data Steward portal to manage all aspects of patient, document, and entity identify management, allowing human intervention to manage possible duplication
- Automated assignment of Universal Patient Identifier
- Data Dictionary and Vocabulary Standardization: Needed to create a standards-based data normalization process for diseases, lab results, diagnosis, and decision support.

The Terminology Services are terminology agnostic, the Transformation Services are message content agnostic, and the Messaging Services are transport agnostic; the combination of which provide rich support for current and future communication protocols, nomenclature, and clinical terminologies.

This architecture allows for a seamless flow of information and ensures the ability to perform real-time clinical decision support through the use of the Verizon Solution.

- Provider Index and Directory: Used to identify and locate providers (doctors and other providers) based on National Provider Identifier (NPI) validation.

Given that providers exist with multiple NPIs, Verizon's approach focuses on the state licensing authority as the source of truth.

The HIE solution receives updated electronic provider lists from multiple systems and automatically reconciles providers using the provider registry and exchanged messages without the overhead of a cumbersome manual process.

Attributes of the Provider Registry include capture and storage of the provider name, participant provider identifier, organization, state license number, and an unlimited number of configurable fields that are made available to optimize automated provider matching.

NPI identifiers can provide a primary or secondary source of reconciliation for the Provider Registry for scenarios where the state licensing authority is not available as a Data Provider.

- Standards-based: Utilizes standard communication protocols, nomenclature, and clinical terminology including, but not limited to, HL7 Clinical Document Architecture, SNOMED CT, and ICD-10. Other standards, or evolving standards, are:
 - SOAP
 - CCD – Continuity of Care Document
 - XML, JSON, BSON
 - DICOM

– LOINC

The Verizon HIE solution's clinical messaging is based on HL-7 v3, XML, and web services. Emerging clinical messaging standards will allow clinical messaging to occur directly with EHR systems.

The Terminology Services are terminology agnostic, the Transformation Services are message content agnostic, and the Messaging Services are transport agnostic, the combination of which provide rich support for current and future communication protocols, nomenclature, and clinical terminologies.

This architecture allows for a seamless flow of information and ensures the ability to perform real-time clinical decision support through the use of the Verizon Solution.

The Messaging Services respond to requests for information which are then orchestrated to support incoming and outgoing transformations to and from HL-7 2.x, HL-7 3.x CDA release 2, CCD, C83, C32, XML, ASTM X12N transactions, including transactions 270/271, 834 and 275, NCPDP, DICOM and other structured formats.

In keeping with HITSP standards and guidance, Verizon's Integration Service supports all widely used clinical terminologies and enterprise data interchange formats.

- Security: User authentication, authorization, non-repudiation, encryption, and access control functionality, including audit logging.

As described above, the Verizon HIE solution creates a Trust Fabric for the statewide exchange based NHIN 2010 specifications supporting the highest degree of guaranteed, secure information delivery.

Security, Patient Privacy, and Consent Management establish the technical and governance trust fabric elements for secure exchange of information as well as the standard specifications required for reliable interoperability.

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- Audit Trail and Node Authentication (ATNA) Integration Profile is managed by the Verizon IHE Services (See Fig 1.) establishing security measures which, together with the Security Policy and Procedures, provide patient information confidentiality, data integrity and user accountability.
- Flexible: Ability to complete any current and future required HIE competencies.

The Verizon HIE solution was designed for flexibility and was architected to demonstrate how the National Health Information Network vision could be engineered in a production environment.

This includes adherence to NHIN 2010 specifications and direct ONC guidance to ensure ease of implementing emerging standards and specifications.

The underlying model for the Verizon HIE solution is the HL-7 RIM from which nearly all advancement in Health IT in the US has been based, including CDA, CCD, C83, and C32.

Verizon is a proven industry leader in implementing emerging HIE requirements as demonstrated by the 2009-2010 NHIN connectivity to federal agencies now in production.

If so, please describe the feature, service, product, or option, and explain how it would support the HIE functionality as described in this RFI.

Verizon Business Response